

CLAIMS

[1] A metal coating removing apparatus for removing a metal coating provided on a surface of a resin, comprising:

5 a first electrode arranged so as to be opposed to an object to be removed;

a second electrode arranged so as to be opposed to the object to be removed at a predetermined distance from the first electrode; and

10 a discharge energy supply portion for supplying discharge energy between the first electrode and the second electrode so as to allow discharging to occur between the first electrode and the second electrode.

[2] The metal coating removing apparatus according to claim 1, wherein at least one of the first electrode and the second electrode is covered with an insulating cover made of an insulating material except for at least a portion opposed to the object to be removed.

15 [3] The metal coating removing apparatus according to claim 2, wherein the insulating cover and the electrode covered with the insulating cover are provided so that relative positions of the insulating cover and the electrode are adjustable.

20 [4] The metal coating removing apparatus according to claim 2, wherein the insulating cover is provided so that one end of the insulating cover contacts with the object to be removed during a removal operation, and the electrode covered with the insulating cover is provided so as to be kept from contact with the object to be removed during the removal operation.

25 [5] The metal coating removing apparatus according to claim 1, further comprising an output control portion for controlling the discharge energy supply portion,

wherein the output control portion controls at least either one of an amount of the discharge energy and a discharge frequency supplied from the

discharge energy supply portion.

[6] The metal coating removing apparatus according to claim 1, further comprising an electrode-to-electrode distance control portion for controlling a distance between the first electrode and the second electrode.

5 [7] The metal coating removing apparatus according to claim 1, further comprising an electrode-to-object to be removed distance control portion for controlling a distance between the first electrode as well as the second electrode and the object to be removed.

[8] The metal coating removing apparatus according to claim 1, further
10 comprising an electrode angle control portion for controlling an angle of the first electrode and the second electrode with respect to the object to be removed in a range of 0 to 90 degrees.

[9] The metal coating removing apparatus according to claim 1, further
15 comprising an image recognition portion for recognizing a shape of the object to be removed.

[10] The metal coating removing apparatus according to claim 1, further comprising a film thickness measurement portion for measuring a thickness of the object to be removed.

[11] The metal coating removing apparatus according to claim 1, further
20 comprising a metal recognition portion for recognizing a type of a metal of the object to be removed.

[12] The metal coating removing apparatus according to claim 1, wherein a distance between the first electrode and the second electrode is not less than 1 mm and not more than 20 mm.

25 [13] The metal coating removing apparatus according to claim 1, wherein a distance between the first electrode as well as the second electrode and the object to be removed is not less than 0.1 mm and not more than 3.0 mm.

[14] The metal coating removing apparatus according to claim 1, wherein

an angle of the first electrode and the second electrode with respect to the object to be removed is not less than 15 degrees and not more than 90 degrees.

[15] The metal coating removing apparatus according to claim 1, further
5 comprising a plasma generation portion for generating plasma between the first electrode and the second electrode.

[16] The metal coating removing apparatus according to claim 15, wherein the plasma generation portion supplies discharge energy between the first electrode and the second electrode so as to allow discharging to occur between
10 the first electrode and the second electrode, thereby generating plasma.

[17] The metal coating removing apparatus according to claim 16, wherein the plasma generation portion allows discharging to occur between the first electrode and the second electrode in the vicinity of a conductive material, thereby generating plasma between the first electrode and the second
15 electrode.

[18] The metal coating removing apparatus according to claim 1, further comprising an insulating member arranged between the first electrode and the second electrode.

[19] The metal coating removing apparatus according to claim 1, further
20 comprising an insulating cap for covering at least front end portions of the first electrode and the second electrode.

[20] A metal coating removing method for removing a metal coating provided on a surface of a resin, comprising:

arranging a first electrode and a second electrode so that they are
25 opposed to an object to be removed; and

supplying discharge energy between the first electrode and the second electrode so as to allow discharging to occur between the first electrode and the second electrode, thereby removing the object to be removed.

[21] The metal coating removing method according to claim 20, comprising controlling at least either one of an amount of the discharge energy and a discharge frequency in accordance with at least either one of a thickness and a type of a metal of the object to be removed.

5 [22] The metal coating removing method according to claim 20, comprising controlling a distance between the first electrode and the second electrode in accordance with at least either one of a thickness and a type of a metal of the object to be removed.

[23] The metal coating removing method according to claim 20, comprising
10 controlling a distance between the first electrode as well as the second electrode and the object to be removed in accordance with at least either one of a thickness and a type of a metal of the object to be removed.

[24] The metal coating removing method according to claim 20, comprising
15 controlling an angle of the first electrode and the second electrode with respect to the object to be removed in accordance with at least either one of a thickness and a type of a metal of the object to be removed.

[25] The metal coating removing method according to claim 20, comprising:

20 subjecting the object to be removed to test removal ahead of time;
 measuring a removal area obtained by the test removal; and
 controlling at least either one of an amount of the discharge energy and a discharge frequency in accordance with a result of measuring the removal area.

[26] The metal coating removing method according to claim 20, comprising
25 generating plasma between the first electrode and the second electrode before arranging the first electrode and the second electrode so that they are opposed to the object to be removed.

[27] The metal coating removing method according to claim 26, comprising

supplying discharge energy between the first electrode and the second electrode so as to allow preliminary discharging to occur between the first electrode and the second electrode, thereby generating plasma between the first electrode and the second electrode, before arranging the first electrode and the second electrode so that they are opposed to the object to be removed.

5 [28] The metal coating removing method according to claim 27, wherein the preliminary discharging is performed in a state where the first electrode and the second electrode are arranged in the vicinity of a conductive material.